conditions or complications. Cesarean delivery is therefore associated with postpartum sterilization.

Most postpartum sterilizations in the United States are not done for medical reasons. The relative contributions of the reasons for sterilization that we have noted in this paper are not known. These issues deserve more attention from health researchers.

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Infant Health Consequences of Childbearing by Teenagers and Older Mothers

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Synopsis

The association of childbearing at early and late ages with various adverse outcomes of pregnancy was explored in data collected in the 1980 National Natality and Fetal Mortality Surveys. The characteristics of interest for teenage mothers were marital status at conception and the trimester of pregnancy in which prenatal care was begun. For married mothers aged 30 years and older, the variables considered were employment status and occupation during the year preceding childbirth and smoking status before and during pregnancy. The pregnancy outcome variables analyzed were the same for both groups of mothers: fetal loss, low birth weight, and low 1-minute Apgar scores.

Although more than half of all births to teenage mothers were to unmarried women, an additional one-quarter of these births were to women who married between the time of conception and the birth of the child. Generally there was little difference in outcomes for teenage mothers who were married at the time of delivery, regardless of their marital status at the time of conception. Pregnancy outcomes for teenagers who did not marry prior to delivery were considerably less favorable.

Nearly 90 percent of women aged 30–34 years who had a first birth in 1980 were employed during the year before delivery, an extraordinarily high labor force participation rate. More than half of these employed mothers were in professional occupations, consistent with their very high levels of educational attainment. Although the analysis is limited by the small numbers of births involved, it appears that professionally employed women generally have the best pregnancy outcomes. When mother's smoking status is taken into account, nonsmokers had more favorable outcomes, with births to professionally employed mothers generally most favored.

CHILDBEARING AT EARLY OR LATE AGES may be associated with a high risk of adverse outcomes for mother and child. Those risks may be substantially reduced, however, if mothers have the social or health characteristics that are associated with more favorable outcomes. In the analysis reported in this paper, the objective was to investigate the effects of selected social and health characteristics on the pregnancy outcomes of teenage mothers and mothers 30 years and older. For teenage mothers, the variables of interest were marital status at conception and birth and the time when prenatal care was initiated. For mothers 30 years and older, the variables of interest were employment and occupation in the year before delivery, and smoking status before and during pregnancy. For both groups of mothers, the pregnancy outcome variables considered were fetal losses of 28 weeks or more gestation per 1,000 live births, low birth weight, and low 1-minute Apgar scores.

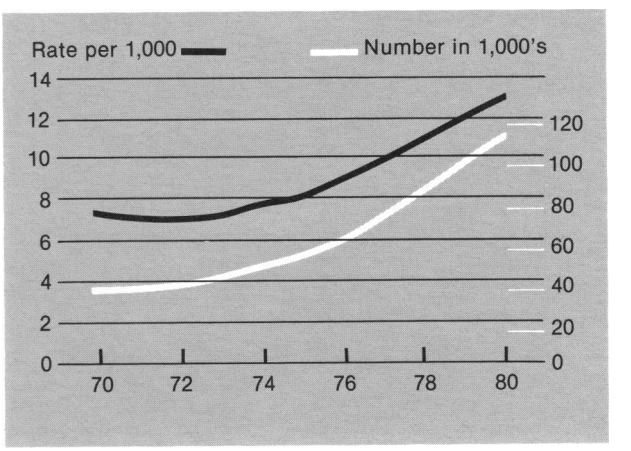
We considered only first births for several reasons: a large majority of births to teenagers, especially out-of-wedlock births, are first births; many mothers over 30 have higher order births, but it is the rapid growth in first births to women at these ages that raises new public health questions. Finally, many adverse effects of childbearing at the older ages are more pronounced among first order births.

Background

During the 1970s, the rate of childbearing by American women declined to the lowest point in the nation's history. That decline had two causes: couples wanted fewer children, and they postponed childbearing to older ages. So many women postponed childbearing so long that a growing proportion were still childless at 30 years: for instance, among white women the proportion childless at age 30 nearly doubled, from 14 percent in 1970 to 27 percent in 1980 (*1*). Although childless women now reaching age 30 expect to have few children—about two on the average—many demographers doubt that they will have even that many (*2*). Some couples will discover that they cannot conceive, and others will change their minds and decide to have only one child or none.

Although many childless couples will not have the number of children that they now expect, it is clear that many are trying. The rate of first births to women aged 30–34 years increased significantly between 1970 and 1980, climbing from 7.3 per 1,000 women to 12.8 per 1,000 (reference *1* and fig. 1). Of course, the rate of first births is up largely because a greater proportion of women reach age 30 without having had a child, but the rate is up partly because childless women 30–34 years are more likely than previously to bear a child. Furthermore, the cohorts of women now reaching age 30—the Baby Boom daughters—are large; these are the women born in the peak birth years of the mid-1950s. In combination, these trends have produced a dramatic increase in the number of first births to women aged 30–34—from 42,404 in 1970 to 112,964 in 1980. In 1970 about 3 percent of first births were to women aged 30–34

Figure 1. First births, 30-34 years: United States, 1970-80



SOURCE: Reference 3 and National Center for Health Statistics: Annual issues of Vital Statistics of the United States, Vol. I, Natality, and unpublished data, Division of Vital Statistics.

years; by 1980 that proportion had increased to more than 7 percent. Increases in first births have also been observed for women aged 35 and older (*1*).

As more women choose to postpone childbearing to an older age, fewer begin childbearing early; the rate of first births to women 15–19 years old fell from about 54 per 1,000 in 1970 to about 40 per 1,000 in 1978, and it has stayed close to that level since (references *1,3* and fig. 2). Although the number of potential adolescent mothers increased in the 1970s, that growth was more than offset by the decline in the probability of childbearing among adolescents. As a result, the number of first births to women under 20 years declined from 509,320 in 1970 to 435,333 in 1980, and the proportion of all first births which were to adolescents fell from 36 percent to 28 percent.

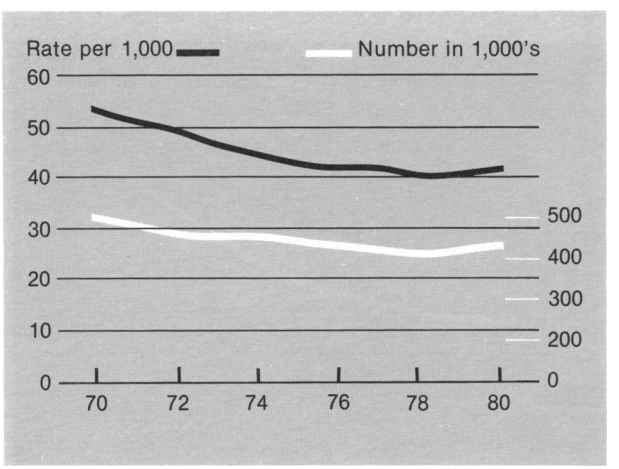
It may seem anomalous that during a period of low and falling teenage fertility, public concern about teenage childbearing was great and rising. Not necessarily. Although fewer adolescents were bearing children, more were conceiving and more were having abortions than in earlier years. Furthermore, among teenagers who bore children, fewer were married before the delivery: for example, the proportion of births to adolescents 15–17 years old that were out-of-wedlock increased from 43 percent in 1970 to 62 percent in 1980 (fig. 3). The birth rate for unmarried women 15–17 years increased from 17 per 1,000 in 1970 to 21 per 1,000 in 1980. Thus, public concern about teenage fertility is not based on the overall trend in fertility among all teenagers, which is stable, but on the trend among younger and unmarried teenagers, which is rising.

Both trends—toward more first births after age 30 and more out-of-wedlock births to teenagers—may have implications for public health, because both types of birth sometimes have been associated with adverse outcomes for mother and child. In a review of the literature, Adams (*4*) found evidence that childbearing at later ages was associated with higher risks of deaths caused by contraceptives (primarily oral contraceptives); spontaneous abortions, especially second trimester abortions; chromosomal abnormality; birth defects, especially chromosomally associated defects; twinning, especially dizygotic twins; and low birth weight, especially very low birth weight among primiparous women. Also, Cohen and coworkers have reported that older nulliparas are at higher risk of labor abnormalities (*5*).

It should be noted that, while the risks of these adverse outcomes may begin to increase after age 30, they do not become pronounced in most cases until ages 35 to 40. Since most first births to women in their 30s occur before age 35 (about 85 percent in the United States in recent years), most are not at much greater risk than births to younger women. Furthermore, many risks may be offset by the low-risk characteristics of the mothers; others can be controlled by medical care. From the research evidence to date, one might conclude, as did Fortney and coworkers (*6*): "that maternal age does influence the outcome of pregnancy . . . but in a population otherwise considered low risk and when pregnancy is well managed, the influence of age can be greatly reduced."

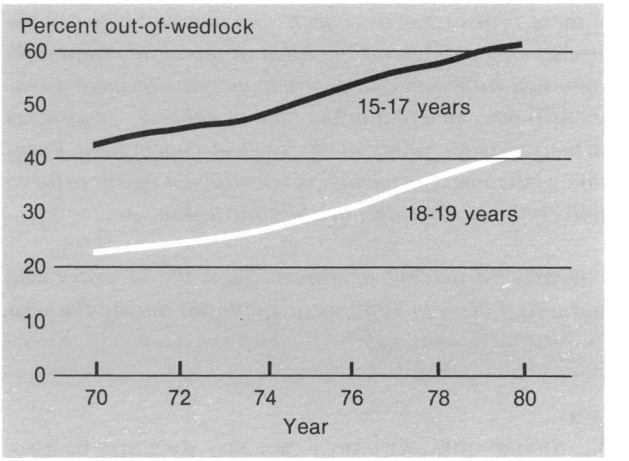
In a recent review of the literature on adolescent pregnancy and childbearing, McAnarney and Thiede (*7*) concluded that youth is associated with a number of adverse outcomes: toxic conditions of the mother (pre-eclampsia, eclampsia, and chronic hypertension) and for the infant, low birth weight, perinatal mortality, and slow cognitive development. The observations are corroborated by

Figure 2. First births, 15-19 years: United States, 1970-80



SOURCE: Reference 3 and National Center for Health Statistics. Annual issues of Vital Statistics of the United States, Vol. I, Natality, and unpublished data, Division of Vital Statistics.

Figure 3. Percent of first births to teenage mothers that were out of wedlock: United States, 1970-80



SOURCE: Reference 3 and National Center for Health Statistics. Annual issues of Vital Statistics of the United States, Vol. I, Natality.

other recent surveys of the research evidence (*8,9*). Lawrence and Merritt (*8*) add low Apgar scores, especially at 1 minute, to the list of adverse outcomes. Although a number of other adverse outcomes have been linked to early childbearing by some researchers, the evidence suffers from various methodological shortcomings. Furthermore, even adverse outcomes that have been carefully documented may not be caused by youthful pregnancy but by other risk characteristics associated with youthful pregnancy, such as inadequate prenatal care and low educational attainment. Rothenberg suggests that, when such correlated high risk factors are statistically controlled, teenage mothers and their infants are as healthy as or healthier than older mothers and their children (*10*).

The consensus view among researchers of adolescent childbearing is not unlike that among researchers of childbearing by older mothers, and it has been well summarized in a 1983 report by Zuckerman and coworkers (*11*): "adolescent mothers are more likely to experience poor pregnancy outcome, especially low birth weight . . . but health and social factors are more important to poor fetal outcome among primiparous mothers than adolescent status." It should be noted however, that adolescent motherhood is associated with other, long-term factors that may affect the subsequent health and well-being of the children born to these young girls. There is, as noted, the high rate of single parenthood, which is associated with marital instability; lower educational attainment of the mother, associated with less skilled and poorly paid occupations; and more stress, possibly associated with higher rates of child abuse and neglect.

Data and Approach

The data for the analysis are from the National Natality Survey (NNS) and the National Fetal Mortality Survey (NFMS), conducted by the National Center for Health Statistics. The NNS and NFMS were based on national probability samples of certificates of births and fetal deaths that occurred in 1980.

For each sample event, information was obtained from several sources; the information used in our analysis was obtained from the certificates or from a questionnaire mailed to the mother (with a followup interview by telephone to nonresponders). To make estimates of national population statistics from the samples, each case was weighted by the number of mothers it was chosen to represent, and the values of the missing data were imputed; the weighted and imputed data were used in our analysis. Technical aspects of the NNS and the NFMS are discussed elsewhere in this issue (*12*). Detailed tabulations on which this analysis is based can be obtained from the senior author.

Older Mothers

Employment. Table 1 shows the number of first births to married women 30 years of age and older, and the percentage distribution of those births by four employment categories: not employed in the year before delivery; employed in a professional occupation (including managerial, technical, and kindred occupations); employed in a sales or clerical occupation; and employed in other occupations. Because previous research has shown that black and white women differ significantly with

Table 1. Percentage distribution of first births to married women aged 30 years and older, according to employment status during year preceding childbirth, occupational group of employed women, and race, United States, 1980

Age of mother and race of child	Number of births		Percentage distribution				
	United States[1]	Sample	Total	Not employed	Professional	Sales, clerical	Other
30 years and older:							
All races[2]	123,000	369	100.0	10.4	48.7	29.4	11.6
White	106,000	313	100.0	9.5	50.1	30.5	9.9
Black	7,000	28	100.0	[3]21.3	[3]23.4	[3]24.1	[3]31.2
30–34 years: all races	106,000	318	100.0	8.9	49.6	30.0	11.4
35 years and older: all races	17,000	51	100.0	[3]19.5	42.5	[3]25.3	[3]12.7

[1] Weighted sample.
[2] Includes races other than white and black.
[3] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

'We considered only first births for several reasons: a large majority of births to teenagers, especially out-of-wedlock births, are first births; many mothers over 30 have higher order births, but it is the rapid growth in first births to women at these ages that raises new public health questions.'

respect to pregnancy outcome and employment, the statistics are shown separately for those racial groups. The numbers of births of races other than white and black are very small and therefore are not shown separately but are included in the all races totals in the tables.

Nearly 90 percent of women 30 or older who had a first birth in 1980 were employed in the year before delivery, the highest labor force participation rate for women in any age and birth order category. Furthermore, these mothers were much more likely than other women to be employed in professional occupations—more than one-half of the employed mothers were professionals. Clearly, women in professional occupations are more likely to postpone childbearing to age 30—or women who postpone childbearing are more likely to be employed in a professional occupation. That pattern is strong among white mothers, but there are so few older black primiparas—7,000 in the nation in 1980—that statistically meaningful analyses cannot be based on this sample, and they are not shown separately in subsequent tables.

Pregnancy outcome. It was noted earlier that childbearing at 30 years and older is associated with a number of adverse outcomes but that the strength of the association depends on the presence or absence of other social and health risk factors. Employment and occupation may modify significantly risks of late childbearing in either of two ways. On one hand, employment, especially in certain hazardous occupations, may increase psychological and physiological stresses, increasing the risk of adverse outcome. On the other hand, employment, especially in professional occupations, may indicate educational and financial resources that may enable the mother to cope effectively with the problems of pregnancy and to improve its outcome. In fact, three-quarters of professionally employed mothers of first-born infants ages 30–34 were college graduates. It is difficult to predict how these two conflicting effects may balance out, especially if only the rather gross employment and occupational categories used in this analysis are examined.

Measures of pregnancy outcome for the four employment and occupation groups are shown in table 2. Professionally employed women generally have the best pregnancy outcomes; that is, the risks of fetal loss and low 1-minute Apgar scores are smaller for births to women in professional occupations. Their infants were slightly more likely than those born to the not employed women to be of low birth weight (6.3 percent compared with 5.9 percent). These measures are based on small numbers of cases and are subject to substantial sampling variability, but the findings and relationships are consistent and therefore seem plausible.

Smoking status. In an attempt to clarify further the association between employment and pregnancy out-

Table 2. Outcome of first births in terms of three infant health measures for married women 30 years and older, according to mother's smoking status, employment status, and occupational group during the year preceding childbirth, United States, 1980

Smoking status of mother and infant health measure	*Total*	*Not employed*	*Professional*	*Sales, clerical*	*Other*
All mothers					
Fetal losses per 1,000 births	5.8	[1]8.9	3.7	6.9	8.6
Percent of infants weighing less than 2,500 gm	7.4	[1]5.9	[1]6.3	[1]9.2	[1]9.0
Percent of infants with 1-minute Apgar scores of less than 7	10.4	[1]14.6	[1]8.6	[1]9.5	16.2
Nonsmoking mothers					
Fetal losses per 1,000 births	5.0	[1]7.6	3.4	6.7	[1]6.8
Percent of infants weighing less than 2,500 gm	6.5	[1]5.8	[1]5.9	[1]8.2	[1]6.3
Percent of infants with 1-minute Apgar scores of less than 7	10.1	[1]8.9	[1]8.6	[1]12.3	[1]13.2

[1] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

come, a habit known to be related to outcome was introduced to the analysis: smoking. Table 3 shows the percent of older primiparas who did not smoke before or during pregnancy. The smoking habits of women differed significantly according to employment and occupation: professionally employed mothers were least likely to smoke before or during pregnancy, mothers in sales and clerical occupations were most likely, and mothers who were not employed were in the middle category. The better health habit of professional mothers seems plausible; they are better educated and probably better read, and therefore they are more likely to be responsive to antismoking information and advice.

The statistics on nonsmokers in table 2 are consistent with other studies that have shown an association between smoking and pregnancy outcome. With just two exceptions, nonsmokers had more favorable outcomes, regardless of employment and occupational category. Furthermore, the relationship of employment and occupation to pregnancy outcome continues to be consistent for professionally employed women, although the outcome measures for these women are only minimally improved for nonsmokers. Again, these findings are subject to sampling variability. Employment is associated with smoking, and smoking is associated with outcome, but the relationship (or lack thereof) of employment to outcome is not explained entirely by smoking. It is probable that the relationship between employment and pregnancy outcome for older primiparas is complex; to understand it will require greater specification of the characteristics of occupations than these data provide and a substantially larger sample.

Table 3. Percentage of primiparas 30 years and older who did not smoke before or during pregnancy, by employment status during year preceding childbirth and occupational group of employed women, United States, 1980

Age of mother	Total	Not employed	Professional	Sales, clerical	Other
30 years and older ...	79.3	77.6	86.4	71.0	71.9
30–34 years	79.2	74.8	87.6	71.3	66.9
35 years and over ..	79.8	[1]85.6	[1]77.5	[1]69.0	[1]100.0

[1] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

Teenage Mothers

Marital status. Table 4 shows the number of first births to teenagers in 1980 as estimated from the NNS, and the percentage distribution by the mother's marital status at conception and birth. Because marital patterns differ markedly by race, the distributions are shown separately for white and black teenagers. A birth to a married teenager was considered to have been conceived before marriage if the estimated date of conception was before the date of the marriage. For clarity, births to married mothers include only those to women who have been married once and the husband is present.

Data presented in table 4 are consistent with those from other sources in showing that 75 percent of first births to teenage mothers were conceived out-of-wedlock, and 53 percent of infants were born out-of-wedlock. These patterns are somewhat attenuated among white teenage mothers and accentuated among black teenage mothers. In fact, so few black teenage mothers in the NNS sample were married at the infant's birth that no statistically meaningful comparisons can be made between outcomes for that group and outcomes for those who gave birth out-of-wedlock. For that reason, subsequent analyses according to outcome are presented only for women of all races.

As noted previously, the high level of out-of-wedlock conceptions and births among teenage mothers was a development of the last two decades. In earlier studies, it was suggested that out-of-wedlock childbearing was associated with a high risk of adverse pregnancy outcomes, such as low birth weight. The mechanism for such an association is not clear, but it may be the selection of high-risk adolescents into the out-of-wedlock category; that is, girls with poor health may be more likely to become out-of-wedlock mothers. If so, the increasing numbers of out-of-wedlock births, and the apparently growing public acceptability of single parenthood, may have reduced the selectivity of marriage, disassociating unwed mothers from other high-risk characteristics. Furthermore, the authors of earlier studies of out-of-wedlock births usually did not investigate out-of-wedlock conceptions that were legitimated by marriage before delivery: by comparing the outcomes for such "legitimated" births with outcomes for out-of-wedlock births, the association of marriage to pregnancy outcome can be determined more precisely.

Statistics relating marital status to pregnancy outcome are presented in table 5. The outcomes for teenage mothers who were married at delivery differed little, regardless of their marital status at conception: outcomes were not significantly or consistently better for "legitimate" births than for "legitimated" births. Premarital conception does not seem to have increased risk, if it was followed soon after by marriage. On the other hand, premarital conceptions that were not followed soon after by marriage had less favorable outcomes with respect to birth weight and 1-minute Apgar scores. Due to sampling variability, some differences in outcome between out-of-wedlock births and other births are not statis-

tically significant, but the consistency of the finding adds to its credibility. For teenage mothers who conceived before marriage (and most did so) a quick marriage seems to be associated with a more favorable outcome of the pregnancy.

Initiation of prenatal care. To explain the association between marriage and favorable pregnancy outcome among teenage mothers, early prenatal care must be considered a strong candidate. A premaritally pregnant teenager who seeks prenatal care almost surely makes her condition known to her parents, friends, and others. Although the public may accept premarital pregnancy more readily now than in the past, pregnancy still causes stress and conflict between teenagers and those close to them. It is understandable, therefore, that pregnant teenagers may be reluctant to disclose their condition, even when they intend to continue the pregnancy. However, if they marry soon after the conception, or plan to do so, an admission of the pregnancy may be easier, less threatening. For the premaritally pregnant teenager with no plans for marriage, the threat of disclosure may be an obstacle to seeking early prenatal care: that obstacle may be considerably less to the teenager who has married since the conception or plans to marry soon. And an earlier study by Baldwin and Cain has shown that early prenatal care can sometimes overcome some risks associated with teenage childbearing (*13*).

Teenage mothers began prenatal care earlier if they were married at conception than if they were not (table 6); and those who were married after conception, but before delivery, began prenatal care earlier than those who were not married at the time of delivery. The differences are substantial; for instance, among white teenagers who conceived before marriage, those who married before the birth were more than twice as likely as those who did not marry to begin prenatal care in the first

Table 4. Percentage distribution of first births to all mothers[1] under 20 years by marital status at conception and birth, according to race of child, United States, 1980

Race of child	Total, all marital statuses		Premarital conception			Marital conception
	United States[2]	Sample	Total	Unmarried at birth	Married at birth	
All races[3]	417,000	1,153	100.0	52.3	22.3	25.4
White	299,000	791	100.0	38.4	29.2	32.4
Black	107,000	330	100.0	88.8	[4]5.0	6.1

[1] For married mothers, includes only those married once, husband present.
[2] Weighted sample.
[3] Includes races other than white and black.
[4] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

Table 5. Outcome of first births in terms of three infant health measures for mothers[1] under 20 years, according to marital status at conception and birth, and trimester of pregnancy prenatal care began, United States, 1980

Trimester prenatal care began and infant health measure	Total, all marital statuses	Premarital conception		Marital conception
		Unmarried at birth	Married at birth	
All mothers				
Fetal losses per 1,000 births	5.2	5.6	3.8	5.9
Percent of infants weighing less than 2,500 gm	8.9	10.8	7.4	6.2
Percent of infants with 1-minute Apgar scores less than 7	10.4	11.1	10.1	9.2
First trimester				
Fetal losses per 1,000 births	4.8	6.1	3.2	4.8
Percent of infants weighing less than 2,500 gm	8.3	13.4	[2]6.1	[2]5.2
Percent of infants with 1-minute Apgar scores less than 7	12.1	15.7	[2]11.5	[2]9.1

[1] For married mothers, includes only those married once, husband present.
[2] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

trimester—44 percent compared with 21 percent. These differences surely are large enough to explain the differences in pregnancy outcome among marital status groups—if early prenatal care reduces risk as much as it is sometimes claimed.

That does not seem to be the case, however, for table 5 shows the same pattern of differences in outcome by marital status among teenage mothers who began prenatal care in the first trimester. Although they had the presumed advantages of early prenatal care, teenage mothers who gave birth out-of-wedlock were more likely than other teenage mothers to have a baby with low birth weight or have a baby with a low 1-minute Apgar score. And those who conceived out-of-wedlock, but married soon after, had outcomes very similar to those whose conceptions were within marriage.

As in table 2, sampling variability makes many of these differences statistically nonsignificant, but their consistency adds to their credibility. That the marital status difference in outcome persists within a group that received early prenatal care suggests that the difference does not result from variations in medical care but from other factors. It is not clear what those factors might be, but one speculation is that married teenagers, even those whose marriage was the hurried response to a premarital conception, are more likely to receive socioemotional and financial support from the baby's father and the couple's parents. That support might reduce stress, contributing directly to a healthy pregnancy; it might also encourage healthier personal habits, specifically better nutrition, contributing indirectly to a healthy pregnancy.

Conclusion

The findings of this study tend to confirm that the risks of adverse pregnancy outcome among older and teenage mothers are reduced if they have certain low-risk characteristics. Specifically, risk is reduced if older mothers are professionally employed, and if teenage mothers are married. The links between these characteristics and reduced risk are not clear. Smoking and prenatal care do not provide a full explanation. From the viewpoint of public health policy, these findings are reassuring with respect to older mothers, but not with respect to teenage mothers. Although more women are having first births after age 30, those women are often professionals whose health or economic circumstances enable them to compensate for any age-related risk of adverse pregnancy outcome. On the other hand, a large and increasing proportion of teenage mothers are single, and therefore lack the protection from adverse outcomes which is associated with marriage.

'The findings of this study tend to confirm that the risks of adverse pregnancy outcome among older teenage mothers are reduced if they have certain low-risk characteristics. Specifically, risk is reduced if older mothers are professionally employed, and if teenage mothers are married. The links between these characteristics and reduced risk are not clear.'

Table 6. Percentage of teenage mothers[1] having a first birth who began prenatal care in the first trimester, by marital status at conception and birth and race of child, United States, 1980

Race of child	Total, all marital statuses	Premarital conception		Marital conception
		Unmarried at birth	Married at birth	
All races[2]	35.7	24.1	43.2	52.8
White	38.2	21.3	44.1	52.8
Black	28.8	27.2	[3] 33.2	[3] 48.9

[1] For married mothers, includes only those married once, husband present.
[2] Includes races other than white and black.
[3] Does not meet standards of statistical reliability; that is, the relative standard error is 25 percent or more.

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Radiation Procedures Performed on U.S. Women During Pregnancy: Findings from Two 1980 Surveys

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Synopsis

The 1980 National Natality Survey (NNS) and 1980 National Fetal Mortality Survey (NFMS) provide a unique opportunity to examine variation in exposure to radiation during pregnancy for mothers of live-born and stillborn infants. Maternal race, age, education, and marital status in both surveys and low birth weight in the 1980 NNS are characteristics used to examine exposure rates for X-ray, ultrasound, nuclear medicine, shortwave, and microwave radiation examinations and treatments.

About 15 percent of mothers of live infants and 23 percent of mothers who experienced stillbirths (fetal deaths of 28 weeks or more gestation) had a medical X-ray procedure during pregnancy. The 15 percent exposed in 1980 was a reduction from 22.5 percent of mothers exposed according to the results of the 1963 NNS; this reduction occurred in all race and age groups. About 34 percent of 1980 NNS mothers and 53 percent of 1980 NFMS mothers had ultrasound exposure during pregnancy. Radiation exposure rates were higher for 1980 NNS mothers who had low birth weight infants (under 2,500 g, or 5 lb, 8 oz) than for those who had normal weight infants.

BECAUSE PREGNANT WOMEN ARE EXPOSED to radiation, public health programs that promote judicious use of radiation equipment in the United States require estimates of the number and characteristics of women examined or treated with radiation, frequency of their visits, and types of examinations. Numerous studies have stressed the need for caution in exposing pregnant women to radiation. As a result of these studies, major public awareness campaigns have been instituted, particularly for X-ray examinations and treatments, since studies have shown a risk of childhood cancer as the result of exposure to X-rays in utero (*1–3*). Subtle effects of exposure to ultrasound in utero have also been noted in laboratory animals (*4,5*). The results of studies of the effects of ultrasound in human beings, although suggestive, remain controversial (*6–9*).

Studies of X-ray exposure among the general population (*10–12*) were conducted in 1960, 1964, and 1970 by the National Center for Devices and Radiological Health (NCDRH) in cooperation with the National Center for Health Statistics (NCHS). However, these studies gave scant information on the exposure of pregnant women. To estimate the exposure of women to X-rays during pregnancy, the NCDRH and NCHS designed the 1963 National Natality Survey (NNS), the first national natality "followback" survey. (Followback refers to